

Health Update: Cancer Risk from Air Pollutants in a Population of Inner-city Teenagers

November 16, 2006



California Air Resources Board

California Environmental Protection Agency

1

Thank you Ms. Witherspoon. Good morning, Dr. Sawyer and members of the Board.

In today's Health Update, we will discuss the results of a study that evaluates the exposure to toxic air pollutants and cancer risk in a population of inner city teenagers.

Toxic Air Pollutants

- Known to cause chronic health effects
 - Cancer, birth defects, serious illness
- Considered to have “no threshold” for cancer effects
- Toxic Air Contaminant Identification and Control Program

2

To provide a little background, we note that toxic air pollutants are known to cause chronic health effects such as cancer, birth defects, and other serious illnesses and conditions.

These compounds typically are considered to have “no threshold” for cancer effects at low exposures. Therefore, even the lowest concentrations are considered to have a risk in causing cancer.

We would like to note that the ARB has established a Toxic Air Contaminant (or TAC) Program to identify and control toxic air pollutants. This program currently has listed approximately 200 TAC compounds.

Background

- Data from Toxic Exposure Assessment-Columbia-Harvard project (TEACH) *
- Inner-city high school students (41 from L.A. and 46 from N.Y.C)
- Personal, indoor, and outdoor exposures
- 13 VOCs and 6 PM-associated metals measured

* Sax et. Al., Environmental Health Perspectives, 114, 1558-1566, Oct. 2006. 3

The study for today's health update is from Sax and colleagues who evaluated data from the study entitled "Toxic Exposure Assessment from Columbia-Harvard" project (or TEACH) for their cancer risk assessment.

Briefly, inner city high school students (41 from Los Angeles, and 46 from New York City) were asked to carry portable samplers for 48 hrs during 2 seasons of the year. Stationary indoor and outdoor samplers were also collected during this study period.

Personal exposure to 13 toxic Volatile Organic Compounds (VOCs), such as formaldehyde and benzene, and 6 particle associated metals, such as chromium, were measured.

Cancer Risk Assessment

- Lifetime cancer risks were calculated from the toxics measured
- Assessment challenges
 - Limited sampling time
 - Limited numbers of students
 - Diesel PM estimates not included
 - Uncertainties in the calculated values

4

Based on exposures, cancer risks were calculated for each of the measured compounds and summed to estimate the lifetime cancer risk.

Some of the challenges of this cancer assessment include the following:

1. The sampling time was limited, to 2 - 48 hour samples for each student during 2 seasons. Samples were taken mid week only.
2. There were a limited number of students, 41 and 46 for LA and NYC, respectively.
3. The cancer risk was based on compounds measured, and other compounds known to be carcinogenic, including diesel PM, were not measured for this study. The carcinogenicity of the mixture of compounds assumes that the effects are additive, not synergistic or antagonistic.
4. There are uncertainties in the methodologies used to calculate risk and so the risk values are considered only estimates.

Study Results

- Lifetime cancer risk results
LA: 490 in a million cancer risk
NYC: 670 in a million cancer risk
- 4-5 times higher than risk based on outdoor ambient measurements
- Highest risk from formaldehyde and 1,4-dichlorobenzene

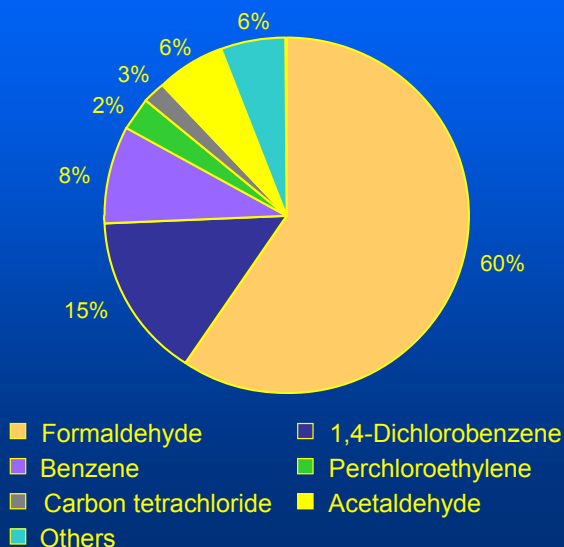
5

This slide summarizes the results of the study. First, the sum of cancer risks for all of the compounds measured for personal exposures was approximately 490 per million for the Los Angeles High School students, and about 670 per million for the New York City students.

These risks were approximately 4-5 times higher than risks based on outdoor ambient measurements of the same set of toxic pollutants conducted at the same time.

The investigators also found that exposures to formaldehyde and dichlorobenzene measured indoors presented the greatest risks.

Distribution of Risk from VOCs in Los Angeles Teens



6

The following pie chart indicates relative risk from the compounds measured in the personal exposure study in Los Angeles. The majority of the estimated risk is from formaldehyde (indicated in the orange area) and 1,4, dichlorobenzene (indicated in the dark blue area), while benzene, perchloroethylene, carbon tetrachloride, and acetaldehyde contribute less to the overall risk.

Conclusions and Implications

- Personal exposures improved indicators for evaluating cancer risks
- Most of the risk from personal exposure to formaldehyde and 1,4-dichlorobenzene
- ARB control measures to reduce risk
 - 1,4-dichlorobenzene – controlled in bathroom deodorizers, air fresheners
 - Formaldehyde – controls being developed for compressed wood products

7

In summary,

Determining personal exposures, compared to measuring outdoor levels of air toxics, may provide valuable information for better evaluating cancer risks, and so may be a helpful tool for assessing the risk to our more vulnerable populations, such as children.

This study found that the personal exposure to formaldehyde and dichlorobenzene accounted for most of the cancer risks in the two cities. And the overall cancer risk estimates for all compounds measured were about 4-5 times higher than risks based on exposure to outdoor concentrations of these compounds.

The investigators indicated that indoor products, such as bathroom deodorizers and air fresheners, were likely sources of dichlorobenzene and that pressed wood products could be sources of formaldehyde. Through the Consumer Products Program, the ARB will phase out dichlorobenzene in deodorizers and air fresheners by Dec. 31 of this year, and staff is developing a regulation to limit formaldehyde in compressed wood products. We anticipate that this regulation will come before the Board in April of next year.

This concludes our health update. We would be happy to address any questions.

Thank you very much for your attention.